ECE3156 – SOFTWARE ENGINEERING
CO1- Test

Time: 30 minutes   Total marks: 25

Instructions:
1. This question paper consists of 2 pages with 1 question only.
2. Please print all your answers in the answer sheets provided.

Question 3

(a) A UML (Unified Modeling Language) diagram depicts the dynamic behaviour of a system or part of a system through the flow of control between actions that the system performs. Draw a **UML sequence diagram** when a customer wanted to withdraw cash or checks balance with an automated teller machine (ATM). The following is a description of the ATM transaction.

<table>
<tr><td>

ATM Transaction

The ATM will need to interact with the bank server and bank account. *(Create a lifeline for these 3 objects)*

The customer insert their bank card at the ATM. The server then verify the card is OK. The customer is prompted for a PIN which is entered via the ATM. If the card is NOT OK, ATM will eject the card.

Customer entered the PIN. If correct, he/she is presented with a menu to withdraw cash. If the PIN is incorrect, the card is ejected to the customer.

The customer is prompted with a request for the amount of cash required and inputs the amount.

If the balance of the account is insufficient, a message is displayed on the screen. The card is returned to customer. If there are sufficient funds in his/her account, the cash is dispensed, a receipt is printed and the account balance is updated. Before the cash is dispensed, the card is returned to the customer.

(Draw activation boxes for each objects and alternative frames if necessary)

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[10 marks]

(b)   A software organization is required to develop a prepaid card for Cash Payment System (CPS) for a retail petrol stations. A system administrator, registered users and a maintenance developer will use this system once it is fully deployed. Description of this software system is as follows:

- The systems administrator is able to view all of the users' petrol usage records.

- Each registered user can only view his/her petrol utilization record.

- Each registered user need to key in 4 digit pins, if successful, a "verified pin" message will appear. If failed, "wrong pin" will appear.

- The systems administrator can verify new users and remove existing users from this system.

- Each registered user can request to be added into or removed from this system.

- Each registered user will be logout from the system when finished. System will ask for "print receipt" if customer wishes to do.

- The system administrator is able to generate a summary of payments made by all registered users on a monthly basis.

- The maintenance developer is able to access usage logs of the CPS software for debugging purposes, if necessary.

Draw a **UML use case diagram** for this system. You may use *<<include>>* and *<<exclude>>* in your diagram. You might have to make a few assumptions about the manner, in which a user interacts with this system.

[8 marks]

(c)   Entity-Relationship Diagram (ERD) is one of the data modeling tools that provides a software engineer with the ability to represent data objects, their characteristics, and their relationships. Use an ERD to describe the following scenario.

- A teacher is identified by an ID number (TID), last name (LName), and first name (FName).
- A project is identified by a project ID (PID) and title (T).
- A student is identified by an ID number (SID), last name (LName), and first name (FName).
- A teacher can supervise zero, one, or many students and a student is supervised by one teacher.
- A teacher must propose one or many projects and every project is proposed by one teacher.
- A student must work on one project and every project is worked by only one student.

[7 marks]

End of Paper